# ANNUAL REPORT FOR 2006

**County Mitigation Site**

**New Hanover County**

**TIP No. U-92 A/B**

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North Carolina Department of Transportation
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# TABLE OF CONTENTS



## FIGURES



## APPENDICES

## SUMMARY

The following report summarizes the monitoring activities that have occurred in 2006 at the County Mitigation Site. The 2006-year represents the third year of hydrology and vegetation monitoring following construction. The site must demonstrate success for a minimum of five years or until the site is deemed successful. The site was constructed to serve as mitigation for impacts associated with the construction of U92-A/B for the Smith Creek Parkway.

A tidal gauge was installed at the Bridge Maintenance site in July 2000 and was used as a reference for the County Site. Tidal data was collected from July 2000 to July 2004. These sites were graded to elevations based on this tidal data.

Hydrologic monitoring utilized four surface water gauges and a reference gauge located on the adjacent Bridge Maintenance Mitigation Site. These gauges monitored the tidal regime to confirm the site's flooding period.

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges satisfied the inundation criteria determined by the reference gauge.

During the July 2004 onsite agency meeting, it was agreed that NCDOT could propose to remove the four surface water gauges at the County Site if there was successful tidal data during the 2004-monitoring season. During the 2004 annual monitoring meeting (May 5, 2005), it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

Vegetation monitoring is required for five years or until the site is deemed successful. Vegetation monitoring of the baldcypress area revealed an average tree density of 108 trees per acre. This average is above the minimum success criteria of 50 trees per acre. For the marsh grass area, the target species and scale values were 67% and 4.5, respectively. NCDOT will continue to monitor the vegetation at the County Mitigation Site.

# 1.0 INTRODUCTION

## 1.1 Project Description

The County Mitigation Site is located in New Hanover County, adjacent to the Bridge Maintenance Mitigation Site and the U-92B project in Wilmington (Figure 1). Totaling 1.9 acres in size, the site provides tidal swamp forest creation mitigation for a portion of the wetland impacts associated with U-92A/B. The Bridge Maintenance Site is utilized to provide reference data for restoration monitoring.

## 1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetation monitoring must be conducted for a minimum of five years or until the site is deemed successful. The following report describes the results of both hydrologic and vegetation monitoring for the 2006-year.

## 1.3 Project History

| | |
|---|---|
| February 2004 | Baldcypress Planted |
| April 2004 | Marsh Grass Planted |
| March-November 2004 | Hydrology Monitoring (1 yr.) |
| August 2004 | Vegetation Monitoring (1 yr.) |
| March-June 2005 | Hydrology Monitoring (2 yr.) |
| September 2005 | Vegetation Monitoring (2 yr.) |
| August 2006 | Vegetation Monitoring (3 yr.) |

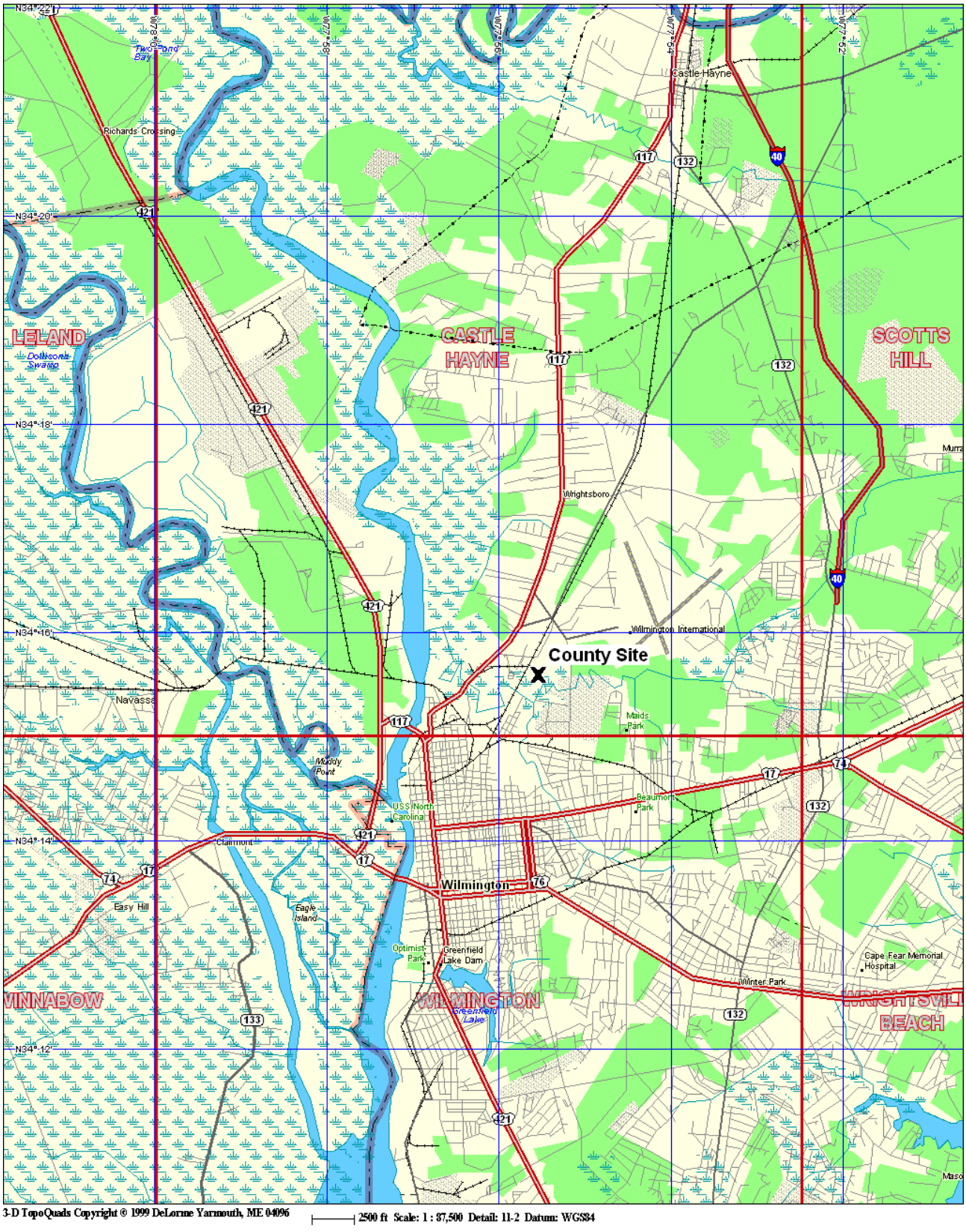



**Figure 1:** Site Location Map

# 2.0 HYDROLOGY

## 2.1 Success Criteria

Groundwater monitoring is not required at this site because it is a tidal system. Instead, data from an offsite tide gauge located at the adjacent Bridge Maintenance Site (collected 02-27-04 through 07-14-04) was used as a baseline to estimate the percentage of time that the site should remain flooded, at specific elevations. A target elevation of 2.5 feet above mean sea level was selected for the County Mitigation Site. Using the baseline data and the proposed elevation, the County Site will be considered hydrologically successful if it is inundated for 25.6% of the growing season, from February 27 to November 26 (271 days).

## 2.2 Hydrologic Description

The County Mitigation Site was equipped with four surface water gauges that were installed in December 2003. Since the site is a tide-driven system, groundwater and rain gauges were not installed. During the 2004 annual monitoring meeting (May 5, 2005), it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005.

## 2.3 Results of Hydrologic Monitoring

Hydrology monitoring has been discontinued at the County Mitigation Site.

## 2.4 Conclusions

During the 2004 annual monitoring meeting (May 5, 2005), it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

# 3.0 VEGETATION: U-92 COUNTY SITE (YEAR 3 MONITORING)

## 3.1A Success Criteria (Baldcypress Area)

One 100' x 100' plot and one 50' x 50' have been set and will be counted as part of the vegetation monitoring for the site.

> The site will be considered a success for the baldcypress if there are 50 five-year old trees per acre after the end of the fifth growing season….changes in the hydrology of Smith Creek have caused the decline in natural baldcypress populations, and it is uncertain if the planted baldcypress trees will survive. If the baldcypress survivorship declines to below the success criteria, then the Department of Transportation will consult with the Corps of Engineers to determine appropriate action.
>
> Establishment of cypress trees over the restoration area of the County Site is proposed, although there is evidence that they may not survive because of increases in salinity, tidal amplitude, and sea level (Hackney and Yelverton, 1990). Consequently, if cypress mortality occurs and the area develops into an emergent marsh community, the vegetational success criteria will be based on emergent marsh vegetation.

## 3.1B Success Criteria (Marsh Grass Area)

The vegetative marsh success of the wetland site will be determined in accordance with NMFS Guidelines. Monitoring plots found to be located within the open water channel will not be evaluated, and will not count to the final count of plots. The vegetation component of the wetland site will be deemed successful if the following criteria are met.

1. At year five, the average of all plots should have a scale value of 5 (>75% vegetative cover) consisting of wetland herbaceous species, not including any invasive species.
2. A minimum of 70% of the plots shall contain the target (planted) species.

## 3.2A&B Description of Planted Areas

The following plant communities were planted throughout the County Site:

Approximately 1.6 acres

*Spartina cynosuroides*, Big Cordgrass

*Cladium jamaicense*, Sawgrass

*Taxodium distichum*, Baldcypress

### 3.3A Results of Vegetation Monitoring (Baldcypress Area)

| Plot # | Baldcypress (3 Year) | Total (at planting) | Density (trees/acre) |
|---|---|---|---|
| **1** (100' x 100') | 31 | 31 | 108 |
| **2** (50' x 50') | 10 | 10 | 108 |
| AVG. DENSITY | | | 108 |

### 3.3B Results of Vegetation Monitoring (Marsh Grass Area)

| ZONE | Plot # | Scale Factor | *Spartina cynosuroides* | *Cladium jamaicense* | Frequency | Notes |
|---|---|---|---|---|---|---|
| 1 | 1 | 5.0 | | | | |
| | 2 | 4.0 | | | | |
| | 3 | 5.0 | | | | |
| | 4 | 3.0 | | ✓ | ✓ | |
| | 5 | 5.0 | | ✓ | ✓ | |
| | 6 | 5.0 | ✓ | | ✓ | |
| | 7 | 4.0 | | | | |
| | 8 | 5.0 | | ✓ | ✓ | |
| | 9 | 4.0 | | | | |
| | 10 | 5.0 | | ✓ | ✓ | |
| | 11 | 5.0 | | | | |
| | 12 | 5.0 | | ✓ | ✓ | |
| | 13 | 4.0 | | ✓ | ✓ | |
| | 14 | 5.0 | | ✓ | ✓ | |
| | 15 | 5.0 | | ✓ | ✓ | |
| | 16 | 3.0 | | ✓ | ✓ | |
| | 17 | 5.0 | | | | |
| | 18 | 5.0 | | | | |
| | 19 | 5.0 | | ✓ | ✓ | |
| | 20 | 3.0 | | ✓ | ✓ | |
| | 21 | 4.0 | | | | |
| | 22 | 5.0 | ✓ | | ✓ | |
| | 23 | 5.0 | | ✓ | ✓ | |
| | 24 | 5.0 | | ✓ | ✓ | |
| | 25 | 5.0 | | ✓ | ✓ | |
| | 26 | 5.0 | | ✓ | ✓ | |
| | 27 | 3.0 | | ✓ | ✓ | |
| | 28 | 3.0 | ✓ | | ✓ | |
| | 29 | 4.0 | | | | |
| | 30 | 5.0 | ✓ | ✓ | ✓ | |
| | | | | | | |
| Freqency (Percentage of Plots with Desired Species) | | | | | 67% | |
| Sum Scale Value | | | | | 134 | |
| Total Number of Plots Counted | | | | | 30 | |
| Vegetative Cover (Scale Value) | | | | | 4.5 | |

**Site Notes**: The following species were also noted in the monitoring plots. The number of plots the species were found in is listed in parentheses (i.e. 6 of the plots contain *Juncus* sp.)

*Juncus* sp. (6), *Sagittaria* sp. (10), woolgrass (1), *Scirpus* sp. (7), cattail (16), *Echinochloa walteri* (5), *Hypericum* sp. (16), baldcypress (3), *Cyperus* sp. (3), glasswort (1), and *Pluchea* sp. (5).

### 3.4A Conclusions (Baldcypress Area)

Baldcypress trees were planted on 20' centers throughout the approximately 1.6 acre site. One 100' x 100' plot and one 50' x 50' plot were established in the planting area. The vegetation monitoring of the planted area revealed an average of 108 baldcypress trees per acre.

### 3.4B Conclusions (Marsh Grass Area)

- Percent Frequency of Target Species **67%**
  Frequency of 70% required.

- Vegetative Cover Scale Value **4.5**
  Scale Value of 5 required for year 5.

Approximately 1.6 acres of this site involved marsh grass plantings. There were 30 random plots established throughout the planting area. These plots were located with GPS. Based upon the percent frequency and the scale value, the marsh grass area is on track for the third year of monitoring.

## 4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

An onsite agency meeting was held in July 2004. At this time, it was agreed to remove the surface water gauge at the Bridge Maintenance Site since there was sufficient past tidal data. The available tidal data for the Bridge Maintenance gauge revealed inundation for 25.6% from February to July (2004). The four surface water gauges at the County Site were compared to the reference gauge. Three of the four surface gauges indicated that the site was inundated 100% of the growing season (hourly readings), while one gauge revealed 94.8%. For the gauge data provided, all four surface water gauges indicated that inundation levels were similar to the reference gauge.

Vegetation monitoring of the baldcypress area revealed an average tree density of 108 trees per acre. This average is above the minimum success criteria of 50 trees per acre. For the marsh grass area, the target species and scale values were 67% and 4.5, respectively. NCDOT will continue to monitor the vegetation at the County Mitigation Site.

During the 2004 annual monitoring meeting (May 5, 2005), it was agreed that the County Mitigation Site had one year of successful gauge data (tidal); therefore the four surface gauges were removed on June 22, 2005 and no hydrologic data has been presented in this report.

NCDOT will continue vegetation monitoring at the County Mitigation Site in 2007.

# APPENDIX A

# SITE PHOTOS
# &
# PLOT AND PHOTO LOCATIONS MAP

# County Site

Photo 1

Photo 2

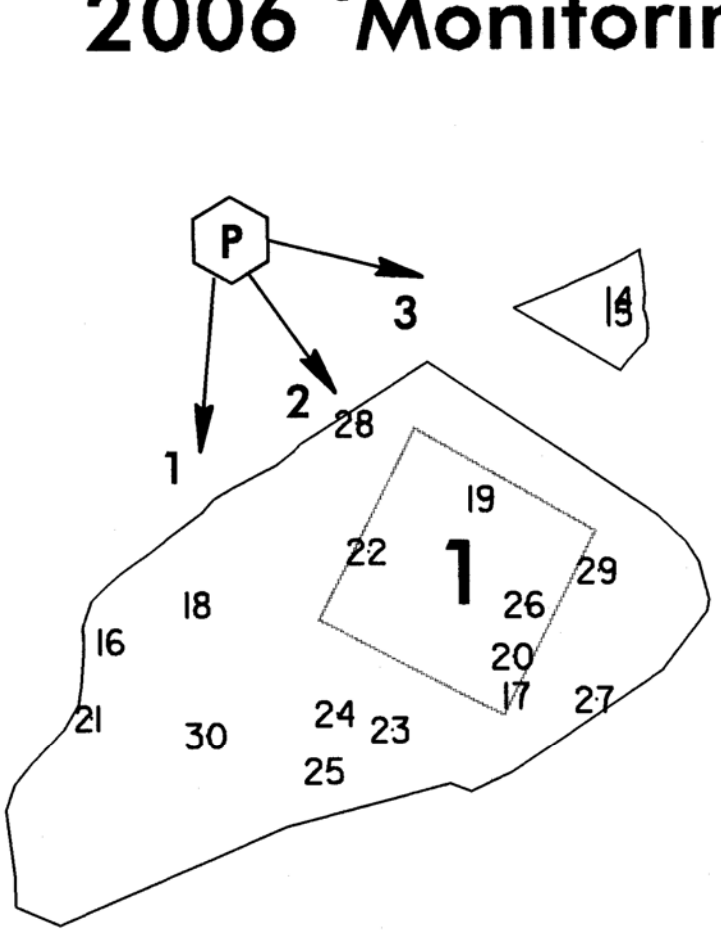
Photo 3

Photo 4

Photo 5

August 2006

# County Site
# 2006 Monitoring



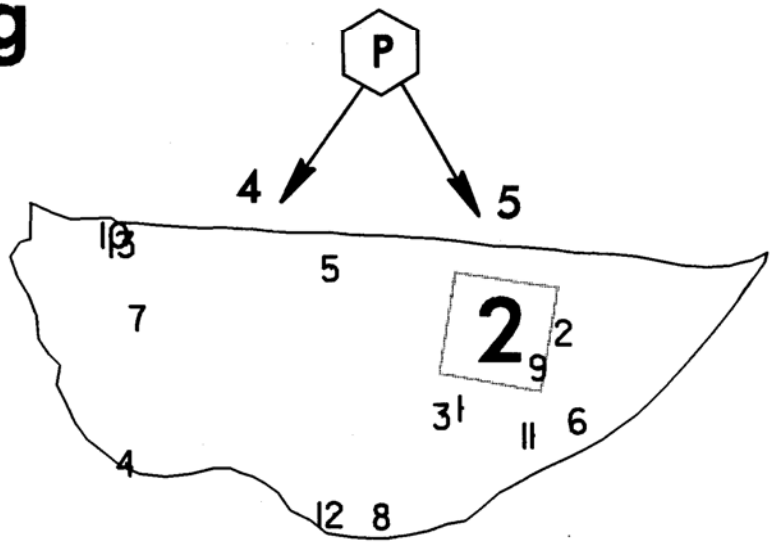




PHOTO LOCATIONS

PLOT LOCATIONS

RANDOM PLOT LOCATIONS